A Clinician’s Toolbox
Newer Respiratory Care Options

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Objective

- Review traditional approach versus newer respiratory care modalities and strategies
- Learn ways to effectively assess your patient respiratory care needs
- Discuss appropriate selection of approach and applying in combination with traditional approach
- Identify effectiveness and ineffectiveness of approach and modify to achieve goal
Mild to Moderate Hypoxemia Without the Need for Humidification

- **Non-rebreather mask**
  - High flow 15LPM to Flush
  - $\text{FiO}_2$ .70 or greater depending on seal

Foundations of Respiratory Care, Wyka, Matthews, Clark

- **Dry gas**
  - Used as short term temporary measure to correct hypoxemia
Mild to moderate hypoxemia
(long-term need > 12 hours requiring humidity)

- **Precision Flow Vapotherm**
  - Low to high flow use
  - 1-40 LPM
  - High humidity - RH > 95%
  - Heated - 33-43 degrees C
  - Used with nasal cannula or trach collar
  - .21-1.0 titrated FiO₂
  - PDP at high flowrates
  - Flow support on inspiration and CO2 washout on exhalation
Mild to moderate hypoxemia
(long-term need > 12 hours requiring humidity)

- **Aquinox**
  - High flow humidified gas
  - 15-35 LPM
  - Titrate FiO\textsubscript{2}
  - Disposable

- **F&P MR 850**
  - High flow humidified gas
  - 10-60 LPM
  - Titrate FiO\textsubscript{2}
  - Disposable
  - Same vent circuit
HFT Devices

- Fisher & Paykel
  - Airvo 2
  - HFNC
    - Humidification
    - Minimal airway flush
    - Minimal or No PDP
  - Trach application
HFT Devices

- Humidified gas
  - 35mg H2O/L
- Trach collar or other open interfaces
- Advantageous when AIR source is not available
- Open system
  - Gas velocity
  - Washout effect
Non Invasive Open Ventilation

- Volume delivery
- Spontaneously triggered
- FiO2 40% to 45%
- Early mobility
- Pulmonary rehabilitation
- Enhance ADL
Mild to Moderate Hypercapnea

- Philips V-60 NIV Ventilator
  - Auto track for flow sensitivity
  - FiO$_2$ titration
  - Humidified

- Respironics FOCUS
  - Latest generation of NIPPV
Mask Selections

- Full Face Mask
- Hybrid - Nasal and Oral
- Nasal Mask
- Total Face Mask
- Nasal Prong
Mild to moderate hypercapnea

- Chest Cuirass
  - Biphasic Cuirass Ventilation
  - Non invasive support
  - Cough assist
  - HFCWO
Sleep Disorders

- Obstructive Sleep Apnea
  - Obesity is the common cause
  - Treatment of choice is CPAP

National Sleep Foundation
Routes of Administration

• **Medication Nebulizer**
  – More effective when mouth piece is utilized
  – Mask if patient is unable to use mouthpiece effectively

• **Breath Actuated Nebulizer**
  – Aerosol activates during inspiration phase only
  – Higher respirable fraction
  – More of medication is delivered
  – Reduce medication waste and exposure
Routes of Administration

- Circulaire II
  - Enhanced medication delivery
  - More drug volume
  - Less drug waste
  - Less clinician exposure-filter
Fractional Inspired Aerosol (FIA)

- Vt 500 ml
- Nebulizer 133 ml
  - 8 lpm flow
- Reservoir 50 ml
- RAE 317 ml
- Aerosol/Vt 183/500
- FIA 37%
Bronchodilator Therapy

- **Continuous Nebulization**
  - Indicated for persistent asthma not relieved by Q1 hour txs
  - Set up with O\textsubscript{2} or Air
  - Patient can remain on humidified nasal cannula
Aerogen

- Applications
  - ED
  - Pediatric ICU
  - NICU
  - Adult

- Supplemental airway hydration
Aerogen
Pulmonary Toilet and Secretion Clearance
(Effective when used in conjunction with humidification)

- Chest physical therapy/Percussion
- Postural drainage
Pulmonary Toilet and Secretion Clearance
(Effective when used in conjunction with humidification)

- ECWO- External Chest Wall Oscillation
  - The VEST therapy
  - Oscillatory flow causes mucous-airflow interaction, reduce sputum viscosity
  - Vented and non-vented patients
  - Strap or vest
Airway Clearance Device

• Mobilize secretion using acoustic vibrations
• PEP- positive expiratory pressure therapy
• Nebulizer treatment for medication delivery
Misty-Fast Nebulizers

Prior To Patient Inhalation

Misty Fast™ small volume nebulizer

Room Air

Pressurized Oxygen/Air
Concurrent Therapy

• JCAHO/ CMMS
  – Requirements relating to concurrent txs
• Treatment time challenges
  – Half the time
  – More volume of aerosol
• Documentation
  – Scanning and Assessment
  – Can be performed with tx- real time
The Frequencer™

- The Frequencer™ is a digitally controlled acoustical airway clearance device.
- Frequencer™ greatly reduces mucus viscosity by applying low-energy resonant vibrations to promote mucus flow.
- The vibration begins to loosen mucus, provoking coughing and the expectoration of sputum.
Lung Expansion Therapy

- **Incentive spirometry**
  - Patient effort dependent
  - Post op atelectasis
  - Inexpensive
  - Encourage patient by all discipline

- **EZPAP**
  - Partly patient effort dependent
  - Can be administered with nebulized medications
  - Mimics CPAP and improves FRC
More Options on Lung Expansion and PEP Therapy
Lung expansion therapy and Secretion Mobilization

- **Lung Flute**
  - Requires cooperative patients
  - Delivers effective fluttering
  - Very effective secretion clearance device
Lung Expansion Therapy

- **Intrapulmonary Percussive Ventilation (IPV)**
  - Delivers percussive breath both on inspiration and expiration (internal chest PT)
  - Administered via mouth piece or mask
  - Partly patient dependent
  - Can be administered with nebulized medications
  - Indicated for persistent atelectasis
Why VDR®? Before; Dec 30th ‘03
Why VDR®? after 4 days; Jan 2nd '04
Nebulizer with Percussions

- Metaneb
  - Secretion mobilization
  - Lung expansion
  - Percussion
  - Administration of medication
Clinical Applications

• Surgical ICU
  – Intervention

• Pulmonary Unit
  – Protocol for weaning

• Burn Unit
  – Protocol for secretion clearance

• Open Heart Unit
  – Protocol to condition/preserve lung/airway
Lung expansion Therapy
Pulmonary Toilet and
Secretion Clearance

• In-exsufflator also known as “Coughlator”
• Neuromuscular disorder
• Vented patients with weak cough reflexes
Mild to Moderate Stridor

- **Heliox therapy**
  - Upper airway obstruction, i.e. stridor
  - Premix or non-premix
Mild to Moderate Hypoxemia with Airway Obstruction

- Heliox Precision Flow
- Airway obstruction- stridor or moderate to severe wheezing.
- Reduces WOB
- 80/20, 70/30 or 60/40 helium and oxygen mixture
- Delivered via high flow NC
Airway Care

• Some credentialed to replace tracheostomy tube
• Trach care and maintenance
• Passy Muir Speaking Valve
  – Phonation
  – Improve swallowing and mucus clearance
Non-invasive Monitoring

- **End Tidal CO₂ Monitor**
  - Monitors exhaled CO₂

- **Transcutaneous Monitoring of CO₂**
  - Sensor attached to earlobe
Airway Inflammation

- Feno measurement/monitoring
- Chronic cough
- Vocal cord dysfunction
- Bronchitis
- COPD
- GERD

- ATS recommended
  - Asthma management guidelines
  - Management of appropriate meds and dosing
Specimen Collection

- **Fiberoptic Bronchoscopy**
  - Performed by authorized physicians
  - Bedside or Lab

- **Mini-BAL Combicath**
  - Uncontaminated specimen for VAP suspected vent patients
  - To reduce Abx use
  - Performed by RCP
  - Requires Physician order

- **Lukens trap**
  - Traditional way to obtain sputum specimen
Airway Patency

- EndoClear
- RescueCath

**ADDRESSING AN URGENT NEED**

“Partial occlusion due to secretion accumulation is ubiquitous and recklessly ignored, with an average estimated loss of intraluminal ETT volume of between 9 and 15%.”
